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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,375	09/28/2001	Jong-Seo Choi	P56533	2237

7590 06/26/2006

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EXAMINER	
QUARTERMAN, KEVIN J	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 06/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/964,375	CHOI ET AL.	
	Examiner	Art Unit	
	Kevin Quarterman	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *7,10,12,20-22,29,48-53,55,57-70,72-74 and 76* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *7,10,12,20-22,29,48-53,55,57-70,72-74 and 76* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 September 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment and remarks received 17 April 2006 have been entered and overcome the objection to the abstract and the rejection under 35 USC § 112, 2nd paragraph recited in the previous office action mailed 18 January 2006.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 51, 57-58, 60, 63, 68, and 72 are rejected under 35 U.S.C. 102(b) as being anticipated by Nakanishi (JP 53-091562 A).

4. Regarding independent claim 51, Figure 2 of Nakanishi shows a cathode comprising a metal base (2); a layer (5) of electron-emitting material disposed upon the base; and a needle-shaped electrically conductive material (4) providing electrically conductive paths disposed throughout the layer of electron-emitting material, the needle-shaped electrically conductive material having a specific resistance not greater than 10^{-1} ohms-centimeter (Abstract).

5. Regarding independent claim 57, Figure 2 of Nakanishi shows a cathode comprising a metal base (2) and a layer (5) disposed upon the metal base, the layer comprising an electron-emitting material, and a needle-shaped electrically conductive

material (4) disposed within the layer and having a specific resistance less than a specific resistance of the electron-emitting material (Abstract).

6. Regarding claim 58, Figure 2 of Nakanishi shows the needle-shaped electrically conductive material (4) providing electrically conductive paths in the layer.

7. Regarding claim 60, Nakanishi discloses a conductive material (carbon) having a specific resistance not greater than 10^{-1} ohms centimeter (Abstract).

8. Regarding independent claim 63, Figure 2 of Nakanishi shows a cathode comprising a metal base (2) and a layer (5) disposed upon the base, the layer comprising an electron-emitting material, and a needle-shaped electrically conductive material (carbon) having a specific resistance not greater than 10^{-1} ohms centimeter (Abstract).

9. Regarding independent claim 68, Figure 2 of Nakanishi shows a cathode comprising a metal base (2); a layer (5) of electron-emitting material including an electron-emitting barium-based alkali-earth metal carbonate material disposed upon the base; and a needle-shaped electrically conductive material (4) providing electrically conductive paths in the layer of electron-emitting material, the conductive material (carbon) having a specific resistance of not greater than 10^{-1} ohms centimeter (Abstract).

10. Regarding independent claim 72, Figure 2 of Nakanishi shows a cathode comprising a metal base (2) and a layer (5) formed on the base from a carbonate paste comprising a carbonate paste containing a barium-based carbonate electron-emitter and a needle-shaped electrically conductive powder (4), the needle-shaped electrically

conductive powder (carbon) having a specific resistance not greater than 10^{-1} ohms centimeter (Abstract).

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

13. Claims 7, 12, 29, 48-50, 52-53, 61-62, 64-65, 67, 69-70, and 73-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakanishi (JP 53-091562 A) in view of Saito (US 6,124,666).

14. Regarding independent claims 7 and 29, Figure 2 of Nakanishi shows a cathode for an electron tube comprising a metal base (2) and an electron-emitting material layer (5) coated on the metal base, the electron-emitting material comprising a needle-

shaped conductive material (4), the needle-shaped conductive material being at least one material selected from a group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum, the needle-shaped conductive material being a carbonaceous material (Abstract).

15. Nakanishi teaches the limitations of independent claims 7 and 29 discussed above but fails to exemplify the needle-shaped conductive material being in a range of 0.01 to 30% by weight based on a total weight of the electron-emitting material layer and a thickness of the electron-emitting material layer being in a range of 30μm to 80μm.

16. Saito teaches that it is known in the art to provide cathode with a conductive material being in a range of 0.01 to 30% by weight based on a total weight of an electron-emitting material layer and a thickness of the electron-emitting material layer being in a range of 30 to 80μm (col. 1, ln. 34-35) for improving the life characteristics of the device (Abstract).

17. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the cathode structure of Nakanishi with a needle-shaped conductive material being in a range of 0.01 to 30% by weight based on a total weight of the electron-emitting material layer and a thickness of the electron-emitting material layer being in a range of 30 to 80μm, as taught by Saito, for improving the life characteristics of the device.

18. Regarding independent claim 12, Figure 2 of Nakanishi shows a cathode for an electron tube comprising a metal base (2) and an electron-emitting material layer (5)

coated on the metal base, the electron-emitting material layer comprising a needle-shaped conductive material (4).

19. Nakanishi teaches the limitations of independent claim 12 discussed above but fails to exemplify the needle-shaped conductive material being at least one material selected from a group consisting essentially of indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum.

20. Saito teaches that it is known in the art to provide cathodes with an electron-emitting material layer including at least one material selected from a group consisting essentially of indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum for providing a cathode that can operate at a high current density (col. 4, ln. 9-18).

21. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the cathode of Nakanishi with an electron-emitting material layer including at least one material selected from a group consisting essentially of indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum, as taught by Saito, for improving the efficiency of the device.

22. Regarding independent claim 48, Figure 2 of Nakanishi shows a cathode comprising a metal base (2); layer means (5) disposed upon the metal base for emitting electrons; and additional means (4) comprising a needle-shaped conductive material (carbon) having a specific resistance not greater than 10^{-1} ohms.

23. Nakanishi teaches the limitations of independent claim 48 discussed above but fails to exemplify the needle-shaped conductive material comprising 0.01 to 30% by weight of the layer means.

24. Saito teaches that it is known in the art to provide cathode with a conductive material being in a range of 0.01 to 30% by weight based on a total weight of an electron-emitting material layer and a thickness of the electron-emitting material layer being in a range of 30 to 80μm (col. 1, ln. 34-35) for improving the life characteristics of the device (Abstract).

25. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the cathode structure of Nakanishi with a needle-shaped conductive material being in a range of 0.01 to 30% by weight based on a total weight of the electron-emitting material layer and a thickness of the electron-emitting material layer being in a range of 30 to 80μm, as taught by Saito, for improving the life characteristics of the device.

26. Regarding claim 49, Saito discloses a metal layer exhibiting a grain size smaller than the metal base and interposed between the metal base and the layer means (Abstract).

27. Regarding claim 50, Nakanishi discloses the needle-shaped conductive material being selected from a group consisting essentially of carbon, indium tin oxide, nickel, magnesium, rhenium, molybdenum, and platinum (Abstract).

28. Regarding claims 52, 64, 69, and 73, Nakanishi teaches the limitations of independent claims 51, 63, 68, and 72, as discussed above, but fails to exemplify a metal layer exhibiting a grain size smaller than the metal base and interposed between the metal base and the layer of electron-emitting material.

29. Saito teaches that it is known in the art to provide a cathode structure including a metal layer exhibiting a grain size smaller than the metal base and interposed between the metal base and the layer of electron-emitting material for improving the life characteristics of the device (Abstract).

30. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the cathode of Nakanishi with the metal layer taught by Saito for improving the life characteristics of the cathode.

31. Regarding claim 53, Saito discloses the conductive material comprising 0.01% by weight to 30% by weight of the layer of electron-emitting material (Abstract).

32. Regarding claim 61, Saito discloses the layer having a thickness in a range of 30 microns to 80 microns (col. 1, ln. 34-35).

33. Regarding claim 62, Saito discloses the conductive material comprising 0.01% by weight to 30% by weight of the layer (Abstract).

34. Regarding claim 65, Saito discloses the conductive material comprising 0.01% by weight to 30% by weight of the layer (Abstract).

35. Regarding claim 67, Saito discloses the layer of electron-emitting material having a thickness in a range of 30 microns to 80 microns (col. 1, ln. 34-35).

36. Regarding claim 70, Saito discloses the conductive material comprising 0.01% by weight to 30% by weight of the layer (Abstract).

37. Regarding claim 74, Saito discloses the needle-shaped electrically conductive powder comprising 0.01% by weight to 30% by weight of the layer (Abstract).

38. Claims 55, 59, 66, and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakanishi (JP 53-091562 A) in view of Saito (US 6,376,976).

39. Regarding claims 55, 59, 66, and 76, Nakanishi teaches the limitations of independent claims 51, 57, and 63, as discussed earlier, but also fails to exemplify the layer of electron-emitting material having a surface roughness being less than 10 microns.

40. Saito teaches that it is known in the art to provide a cathode structure with a layer of electron-emitting material having a surface roughness less than 10 microns for improving the resolution of the display (col. 7, ln. 37-40).

41. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the cathode of Nakanishi with a layer of electron-emitting material having a surface roughness less than 10 microns, as taught by Saito, for improving the resolution of the display.

42. Claims 10 and 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakanishi (JP 53-091562 A) and Saito (US 6, 6,124,666), as applied to claim 7 above, and further in view of Saito (US 6,376,976).

43. Regarding independent claims 10, 20, and 22, Nakanishi and Saito '666 teaches the like limitations of independent claim 7, as discussed earlier, but fails to exemplify the layer of electron-emitting material having a surface roughness being less than 10 microns.

44. Saito '976 teaches that it is known in the art to provide a cathode structure with a layer of electron-emitting material having a surface roughness less than 10 microns for improving the resolution of the display (col. 7, ln. 37-40).

45. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the cathode of Nakanishi with a layer of electron-emitting material having a surface roughness less than 10 microns, as taught by Saito, for improving the resolution of the display.

46. Regarding independent claim 20, Saito discloses a metal layer including nickel grains having sizes smaller than the sizes of grains in the metal base, the metal layer being formed between the metal base and the electron-emitting material layer (Abstract).

47. Regarding claim 21, Saito also discloses the metal layer further including at least one metal selected from a group consisting essentially of aluminum, tungsten, tantalum, chromium, magnesium, silicon, and zirconium (Abstract).

48. Regarding independent claim 22, Saito also discloses the metal layer having a thickness in a range of 1 to 30μm (col. 3, ln. 59-63).

Conclusion

49. The indicated allowability of claims 7, 12, 29, 51-53, 55, 57-70, 72-74, and 76 is withdrawn in view of the newly discovered reference of Nakanishi.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quarterman whose telephone number is (571) 272-2461. The examiner can normally be reached on M-TH (7-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kevin Quarterman
Examiner
Art Unit 2879

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17 June 2006

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